



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,484	09/26/2003	Tsuyoshi Sasaki	242943US0	8003
22850	7590	05/30/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				CANTELMO, GREGG
ART UNIT		PAPER NUMBER		
1745				

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/670,484	SASAKI ET AL.	
	Examiner	Art Unit	
	Gregg Cantelmo	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-9 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/26/03.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement filed September 26, 2003 has been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

3. The drawings received September 26, 2003 are acceptable for examination purposes.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The phrase "from one composition to the other composition" is unclear as to what compositions the gradient is formed across. In addition there is insufficient antecedent basis for the terms "one composition" and "the other composition" since the claims fail to reasonably set forth what these compositions are associated with in the claim construct.

b. The phrase 'has been substituted and solved" of claim 8 is unclear as to what this term is meant to define. The claims lack any clarity as to what the substitution and solving is obtained in relation to the claimed product and thus renders the claim indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,803,134 (Sammells).

Sammells discloses a secondary cell (abstract) comprising a positive electrode 14 and a negative electrode 11 both comprising solid active materials, an electrolyte layer 13 intervened between the electrodes (lone figure), wherein the positive electrode is a complex metal oxide which is capable of inserting/elimination oxygen ions or absorbing/releasing oxygen (col. 3, ll. 45-65 as applied to claim 1).

Electrolyte layer 13 is a solid oxygen ion conductor (col. 3, ll. 15-45 as applied to claim 6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over P.G. Bruce et al. "Intercalation compounds with lithium and oxygen guests" (hereafter referred to as Bruce).

Bruce discloses that Ceria-Zirconia complex oxides, such as $\text{Ce}_2\text{Zr}_2\text{O}_7$, have been studied as alternative intercalation materials in rechargeable cells (page 206, 2nd paragraph as applied to claims 1-5). The material having the same composition as that claimed is expectant to exhibit the same properties as recited in claim 5.

The study of intercalation of oxygen in pyrochlore materials extends the range of oxygen intercalation in a given electrode.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that the prior art ceria-zirconia complex oxide has the same composition as that of the instant application and thus is expectant to exhibit the same properties.

The Examiner requires applicant to provide that that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on *prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596

(CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Bruce does not discuss the particular cell structure but is apparently drawn to solid-state devices (see page 205, 1st paragraph under introduction).

Given the overall teachings of Bruce which are directed generically to solid state secondary batteries and that Bruce also recognizes using pyrochlore structure, oxygen intercalating materials, one of ordinary skill in the art would have found it obvious to construct a solid state secondary device using Ceria-Zirconia complex oxides, such as $\text{Ce}_2\text{Zr}_2\text{O}_7$ as the electrode materials in the secondary device wherein a solid state electrolyte would be disposed between the two electrodes. The core technology for electrolyte and electrode materials wherein oxygen ions and electrons are the basis for the electrochemical activity is well established in the solid oxide fuel cell art and would have been an apparent source of information for selecting the details of the cell structure, absent the use of the fuel and air plumbing associated with a fuel cell which would not be necessary in an oxygen intercalated secondary cell.

Furthermore since the Ceria-Zirconia complex oxide of Bruce is directed to the intercalation of divalent oxygen ions, it would have further been obvious to select the electrolyte material to be an oxygen ion conducting electrolyte so that the oxygen ions can effectively transport between the intercalating electrodes of the secondary battery and generate the requisite electrochemical activity for the secondary cell using such complex oxides.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bruce by constructing a solid state device using the Ceria-Zirconia complex oxide oxygen-intercalating material to effectively provide for an alternative secondary battery using divalent oxygen ions as the ion-conducting material of the electrochemical cell. It would further have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bruce by selecting the electrolyte to be an oxygen ion conducting electrolyte so that the oxygen ions can effectively transport between the intercalating electrodes of the secondary battery and generate the requisite electrochemical activity for the secondary cell using such complex oxides.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce as applied to claim 6 above, and further in view of U.S. Patent No. 6,287,716 (Hashimoto).

The difference not yet discussed is of providing a gradient between the electrodes and electrolytes.

While Hashimoto is directed to fuel cells, the teachings therein would be reasonably applicable to the teachings of Bruce which obviates the construction of an oxygen ion conducting solid state battery as discussed above.

Hashimoto teaches that it is known in the art to provide gradient compositions between the electrodes and electrolytes in oxygen ion solid-state devices (abstract and figures).

The motivation for providing a gradient composition between the electrodes and electrolyte in a solid-state device is that it improves the integration and bonding between the electrode and electrolyte layers.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bruce by providing a gradient composition between the electrodes and electrolyte in a solid-state device since it would have improved the integration and bonding between the electrode and electrolyte layers.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce as applied to claim 6 above, and further in view of U.S. Patent No. 5,298,235 (Worrell).

The difference not yet discussed is of providing a doped zirconia solid electrolyte between the Ceria-Zirconia complex oxide electrode materials of Bruce.

While Worrell is directed to fuel cells, the teachings therein would be reasonably applicable to the teachings of Bruce which obviates the construction of an oxygen ion conducting solid state battery as discussed above.

Worrell discloses that multivalent metal-doped zirconia electrolyte materials are recognized in the art (abstract) which provide high oxygen ion mobility in and across the electrolyte.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bruce by selecting the electrolyte material to be a multivalent metal-doped zirconia electrolyte material since it would have provided high oxygen ion mobility in and across the electrolyte. In addition

the provision of the multivalent material would have improved the stabilization of the zirconia electrolyte. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

9. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce as applied to claim 6 above, and further in view of U.S. Patent No. 5,403,461 (Tuller).

The differences not yet discussed are of providing a gradient between the electrodes and electrolytes (claim 7) and of the active material and electrolyte having crystal structures of the same Bravais lattice (claim 9).

While Tuller is directed to fuel cells, the teachings therein would be reasonably applicable to the teachings of Bruce which obviates the construction of an oxygen ion conducting solid state battery as discussed above.

Tuller discloses providing a compositional gradient between the electrodes and electrolyte (col. 3, ll. 5-15 as applied to claim 7). Tuller also discloses providing electrodes and electrolytes in a solid-state electrochemical device all having the same crystal structure (see abstract and claim 41 as applied to claim 9).

The motivation for providing electrodes and electrolytes in a solid state electrochemical device all having the same crystal structure as well as providing a compositional gradient between the electrodes and electrolyte is that it allows for a simplified processing since a single crystalline phase is used for the solid electrode and

electrolyte cell components with the ability to compositionally grade the electrochemical apparatus by providing compositionally graded layers between the solid electrolyte and solid electrode thereby further minimizing thermal-mechanical stresses within the electrochemical apparatus.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bruce by providing both a compositional gradient between the electrodes and electrolyte and providing the same crystal structure to each of the electrodes and electrolyte since it would have provided a simplified processing and minimized the thermal-mechanical stresses within the solid-state device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



gc
May 25, 2006

Gregg Cantelmo
Primary Examiner
Art Unit 1745